HUMAN ENGINEERING

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FEW there are who understand the full value of the human factor in engineering; it is necessary to understand the human factor with which we as engineers must deal, as well as to understand the ordinary materials and methods of engineering.

In the old days, when the owner of the plant or shop was also its manager, he had daily opportunities for personal contact with his men; there was no wide gap between capital and labor, as far as daily contacts were concerned, and the wise employer was truly a human engineer. But with the expansion and enlargement of industries that came with the corporate form of business organization, the gap between the worker and the financer widened and has continued to widen. With this expansion of industry there developed a third industrial class, including, among others, the foreman, the superintendent, the engineer, and the employment manager, whose duty it has become to act as "middleman" between capital and labor.

The important thing about this trend of development is that the induvidual worker has become a cog, more or less, in one great industrial machine; he has combined with his fellow-workers into unions and has chosen to bargain collectively with his employers, just as they, collectively, have chosen to employ him. And the reason for his doing this is that he has not been dealt with as a human being possessing a mind and a soul, but merely as a machine or tool. It is plain to be seen that if the "middleman" had recognized the human factor in the worker, the necessity for labor unions would never have arisen.

Human engineering, in the broadest sense of the word, includes all the activities of one man with his fellows. More specifically, it may be defined as the art of getting along well with one's fellowmen while accomplishing material progress in (1) directing, (2) being directed in, or (3) co-operating in, a project of economic value.

The narrow technical engineer is the engineer of the past. The engineer of the present and the future is one with a more thorough training in the fundamentals, with a knowledge of men and things and a human understanding broad enough in its scope to see in even the most illiterate immigrant not merely a human being who is but a cog in a great industry, but a future American citizen and fellow countryman; who, by virtue of his love of country, is willing and anxious to help that immigrant to learn our language, to establish his home, to find his place in our industries, to assimilate our customs, and to teach him to love and respect the institutions of his adopted country—in short, to become an American citizen resepected by his fellowmen.

The modern engineer must also possess the ability to obtain the cooperation of those who work with him, and at the same time give to them such knowledge from his own fund as will be of benefit, and secure from them that which is necessary for him to have in order to fit in with the scheme of things. He will find this true whether he works in the research laboratory, on the construction job, as operating engineer, as shop superintendent or foreman, as designer, or as sales engineer.

The modern engineer must realize that men were made to develop in body, mind, and spirit; and that if the body and mind are substandard, the moral and spiritual standard cannot be normal. He must see that attention is given to the *allround* man.

This allround welfare of the workers is the practical concern of every employer. The sub-standard body costs industry its thousands; intelligence below par costs its tens of thousands; but small are these compared with the loss that comes when the spirit of good will is lacking! Then comes careless neglect; then sabotage; then open strife; then destruction. The spirit of the workers is industry's greatest asset—or liability. Good will cannot be gained by material forces; human contacts alone must create it.

It is necessary to consider the qualities which the modern engineer must possess in order to deal adequately with the human factor in engineering. Briefly stated, they are:

1. Personality.—The engineer who gets along well with his men is the engineer who makes their interests his interests; who can stimulate in them loyalty and integrity, and a desire to improve their work.

2. Fair Play.—The engineer must have a sense of fair play and use it; he must be humane; he must have sympathy; but, above all, he must be just.

3. Discipline.—The man in charge must have undisputed charge. He must be right; a thing is not right because he says so, but he must say so because it is right.

4. Knowledge of human nature.—Psychology, in the practical sense of the word. is the science of the human mind and its operations. We are therefore particularly interested in all those things which affect the man's mind —the environment of the worker, his recreation, and his domestic life, as well as conditions of safety and sanitation where he works. The engineer must let the human element enter in dealing with his men, and must listen to their troubles and be one with them in helping to solve their problems.

What, then, does the necessity for dealing with the human element in industry mean? It means that the principles of democracy must be applied to industry. *Just as autocracy in government has failed, so has autocracy in industry failed.*